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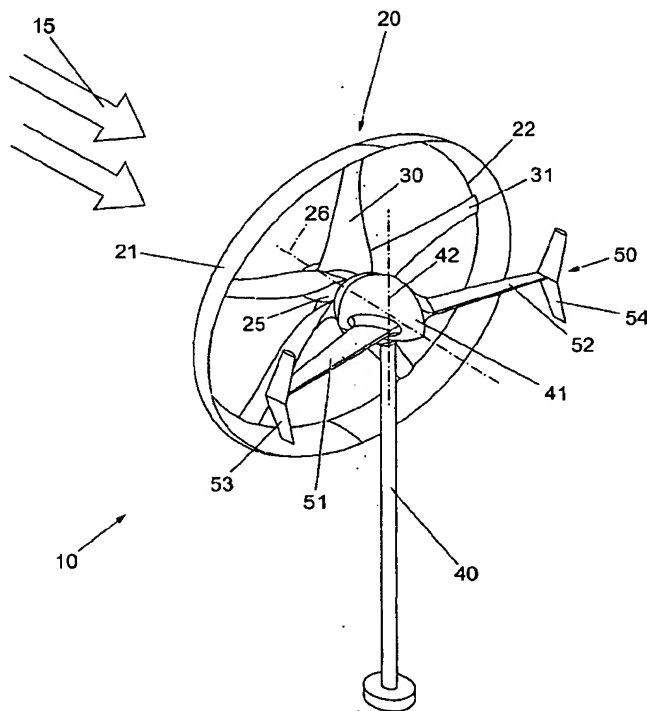
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(54) Title: WIND TURBINE



(57) Abstract: There is described herein a rotor for a wind turbine comprising a plurality of radial blades and a ring-shaped aerofoil diffuser connecting the outer tips of the blades. Further there is described a wind turbine comprising said rotor and further comprising a nacelle and a mounting means adapted to allow rotation of the turbine and rotor about a directional axis perpendicular to the rotational axis, thus allowing the turbine to be oriented in the optimum direction depending on wind conditions. A furling means is disclosed to effect a change in orientation depending on wind speeds. A wind turbine system is also disclosed comprising: a wind turbine driven generator and means for providing a power output, the power output connected to a heating system, a grid-tie inverter or stand alone inverter adapted to supply power to local or grid power infrastructure, or an energy storage system. A method of controlling the level of power taken from a wind turbine; and a wind turbine comprising means for reducing the operating vibrations caused by harmonic resonance within the turbine, tower and mounting structure are also described.

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# INTERNATIONAL SEARCH REPORT

International Application No  
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A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 F03D1/04 F03D1/06 F03D7/02 F03D9/00 F03D9/02  
F03D11/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 F03D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 1 467 227 A (G.M. CAPELL) 4 September 1923 (1923-09-04)	1-13
Y	page 1, line 10 - line 63; figure 1	14-23, 48-56
X	US 5 910 688 A (LI WAN-TSAI) 8 June 1999 (1999-06-08) column 2, line 15 - line 59; figures	1-5,7-12
X	GB 213 022 A (CHARLES ESMOND NIGHTINGALE) 27 March 1924 (1924-03-27) the whole document	1-8
X	US 104 918 A (C.H.ST. CLAIR) 28 June 1970 (1970-06-28) the whole document	1,2,4,5, 7-9
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

30 August 2004

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# INTERNATIONAL SEARCH REPORT

International Application No  
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 92 18 214 U (MOELZER HANS DR MED) 9 September 1993 (1993-09-09) page 2, paragraph 2 - page 3, paragraph 1 page 4, paragraph 3; claims; figures	1-3,7,8, 12
Y	GB J01175A (CHILDS JOSEPH GERSHOM ; HILL THOMAS SIDNEY (GB)) 13 January 1910 (1910-01-13) the whole document	14-23, 48-56
A	US 1 661 847 A (OLSON EDWIN N ET AL) 6 March 1928 (1928-03-06) the whole document	13-19, 21,23
A	DE 32 31 496 A (MOLZAN EMIL) 8 March 1984 (1984-03-08) abstract; figures page 7, line 26 - page 8, line 35	13-17
Y	DE 92 17 043 U (E. BRONESKE) 25 February 1993 (1993-02-25) page 1, paragraph 3 - paragraph 4; claims; figures	48-56
A	EP 1 065 374 A (MITSCH FRANZ) 3 January 2001 (2001-01-03) abstract; figure 1 paragraph [0005] - paragraph [0008] paragraph [0015] - paragraph [0018]	48,49
Y	EP 0 657 647 A (MARCONI GEC LTD) 14 June 1995 (1995-06-14) column 3, line 19 - line 41; figures 1,3	50-56
A	US 3 342 447 A (MARSH SYDNEY W) 19 September 1967 (1967-09-19) the whole document	50-56
A	US 4 363 149 A (KONDO TOKIO ET AL) 14 December 1982 (1982-12-14) the whole document	50-56
A	US 4 469 956 A (D AMATO RICHARD) 4 September 1984 (1984-09-04) the whole document	50-56
A	US 4 193 005 A (HARNER KERMIT I ET AL) 11 March 1980 (1980-03-11) the whole document	1-56

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/GB2004/001176

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-23, 48-56

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-23,48-56.

A rotor for a wind turbine with a plurality of blades and a ring-shaped aerofoil diffuser connecting the outer tips of the blades

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2. claims: 24-47

A wind turbine with an electronic control system, wherein i.e. electrical power may be supplied to energy dissipaters when the power from the wind exceeds a predetermined power and a method of controlling the level of power taken from a wind turbine.

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB2004/001176

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 1467227	A	04-09-1923	NONE	
US 5910688	A	08-06-1999	DE 29709393 U1	14-08-1997
GB 213022	A	27-03-1924	NONE	
US 104918	A		NONE	
DE 9218214	U	09-09-1993	DE 4202649 A1 DE 9218214 U1	05-08-1993 09-09-1993
GB 190901175	A	13-01-1910	NONE	
US 1661847	A	06-03-1928	NONE	
DE 3231496	A	08-03-1984	DE 3231496 A1	08-03-1984
DE 9217043	U	25-02-1993	DE 9217043 U1	25-02-1993
EP 1065374	A	03-01-2001	DE 19930751 A1 EP 1065374 A2	04-01-2001 03-01-2001
EP 0657647	A	14-06-1995	GB 2283803 A EP 0657647 A1 US 6213721 B1	17-05-1995 14-06-1995 10-04-2001
US 3342447	A	19-09-1967	GB 1046537 A DE 1299015 B NL 6508396 A	26-10-1966 10-07-1969 31-12-1965
US 4363149	A	14-12-1982	NONE	
US 4469956	A	04-09-1984	NONE	
US 4193005	A	11-03-1980	AU 526931 B2 AU 4963079 A BR 7904968 A CA 1120538 A1 DE 2961688 D1 DK 344079 A EP 0008584 A1 FI 792440 A ,B, IL 57944 A IN 151737 A1 JP 1499216 C JP 55029085 A JP 63045509 B KR 8402220 B1 NO 792639 A ,B, SU 1098527 A3 ZA 7903946 A	10-02-1983 21-02-1980 06-05-1980 23-03-1982 18-02-1982 18-02-1980 05-03-1980 15-02-1980 30-12-1983 16-07-1983 29-05-1989 01-03-1980 09-09-1988 03-12-1984 19-02-1980 15-06-1984 30-07-1980